

## Serge RIAZANOFF

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### PROJECT DIRECTOR

#### Engineering of Information Systems Processing of Earth Observation Data

## PROFESSIONAL EXPERIENCE

### Director

### VisioTerra

Since May 2004: I have founded a company specialised in Scientific Consulting for Earth Observation.

My experience in Earth Observation domain enables me to perform studies for data quality control, conception of new added value products, assessment of prototypes. Together with my teaching skills, I have produced various books, manuals, papers, reports and communication documents targeted toward a wide public.

### Director

### GAEL Consultant

July 1992 to March 2004: I have founded a company specialised in the development of software to process Earth observation data.

Through prestigious customers, GAEL Consultant is recognised for implementing cartography applications, developing orbital models, managing heterogeneous data, promoting new image processing techniques...

General manager of GAEL Consultant, I have also carried out commercial and technical duties.

### Professor

### University of Marne La Vallée / ENSG / University Paris VI

Since March 1993: Lecturer promoted Associated Professor on March 2002. Half-time employment. Responsible for the follow-up of company trainees. Referee for the Validation of Professional Experience (VAE).

*Teaching*: "Image processing", "Fusion of heterogeneous data", "GIS and geodesy", "Graphical interfaces", "Algorithmic".

*Research*: Follow-up of PhD students and trainees of the Master « Geographic Information Systems ». Participation on thesis examination boards.

### Project Manager

### TELESPAZIO

June 1990 to June 1992: During two years involvement in the Italian company Telespazio S.p.A., I have been responsible for the two following projects :

- **I-PAF Q.A.** : Manager of Quality Assurance activities for the development of the I-PAF system in charge of ERS-1 image reception at Matera station. I published the "Quality Assurance Plan" compliant with ESA and IEEE standards.
- **TELIMAGO** : Manager of the TELIMAGO project, a system for image processing. Development of a multi-language platform based on X11/R4 and Motif 1.2 to integrate algorithms processing RADAR images.

**Computer sciences teacher****University of Villetaneuse**

October 1985 to June 1990 : In charge of lectures for continuing education for DUT degree course at IUT of Villetaneuse.

**Engineer****CISI Ingénierie**

March 1986 to May 1990 : Engineer promoted Project Manager in Image Processing, member of the « Expert Club » of CISI group. In particular I carried out the following activities:

- **CP-IMAGE** : development, documentation and maintenance of CP-IMAGE software of image processing. User Training.
- **Expertise** : Response to invitation to tenders, edition or validation of specification documents.
- **Customer Assistance** : Elf Aquitaine, CFP-TOTAL, IFP, CHS, CEA, COGEMA....

**Engineering trainee****SFENA**

April to June 1985 : Trainee of DEA. Subject: "Synthesis of images to support aerial navigation".

**Analyst-Programmer****G-CAM**

July 1984 to November 1985 : Commenced as a Programmer and then promoted as Analyst-Programmer in the company G-CAM (subsidiary of the « Caisse des Dépôts »), I have been involved in projects of property and banks.

**Teacher (primary school and secondary school)****Éducation Nationale**

October 1978 to June 1984 : After having received an education at "Ecole Normale", I obtained the Certificate of Pedagogic Aptitude enabling to teach children of the Primary School. From the diploma obtained during the evening classes, I was promoted Professor of Mathematics and Physics obtaining the Certificate of Pedagogic Aptitude for Secondary Schools.

**EDUCATION**

1989	Ph.D. in " <i>Physical methods in remote sensing</i> ", Paris 7 University. Subject of the thesis " <i>Automatic extraction and analysis of networks from digital elevation models – Contribution to analysis of remote sensing images</i> ".
1985	Diploma of advanced studies (DEA), Paris 6 University « <i>Algorithmic processing of information</i> », module « <i>Pattern recognition</i> » University Paris 6.
1984	Master in Computer Sciences, Paris 6 University. Options : " <i>Artificial Intelligence</i> ", " <i>Micro-informatique</i> ", " <i>Operating Systems</i> ", and " <i>Computer Sciences for Management</i> ".
1983	Bachelor degree in Computer Sciences, University Paris 6.

**LANGUAGE SKILLS**

English :	Three months training, intensive professional practice.
Italian :	Two years in Italy (Rome) and professional practice.
German :	School knowledge (seven years) and linguistic journeys.
Spanish:	School knowledge (four years) and linguistic journeys.

## PUBLICATIONS

- April 2006 "IGAT – Quality of geographic information – Chapter 4: Quality of raster data" – Ed. HERMES (English edition).
- October 2005 "IGAT – Qualité de l'information cartographique – Chapitre 5: Qualité des données matricielles" – Ed. HERMES (French edition).
- August 2005 "Recensement des solutions techniques et des acteurs de la recherche dans le domaine du géoréférencement", 30 pages, document edited for the DGA.
- July 2005 "Envisat MERIS Geometry Handbook", 104 pages, 46 figures, 10 equations, document edited for the European Space Agency.
- April 2004 "The new Digital Elevation Model from the SRTM: Hydrogeomorphological applications in the Ohrid region" – BALWOIS conference on Water observation and information system for decision support – Ohrid, Macedonia – April 25-29 2004.
- March 2004 "SPOT Vegetation / Envisat MERIS – Complementarity and Comparison" – International SPOT 4/5 VEGETATION Users Conference – Antwerp, Belgium – March 24-26 2004.
- August 2003 "Multitemporal MERIS Synthesis – Technical Note", 74 figures, 118 pages, document edited for the European Space Agency.
- April 2002 "Preserving cartographic quality in DTM interpolation from contour lines", ISPRS Journal of Photogrammetry and Remote Sensing, Vol. 56 (3) (2002) pp. 210-220.
- March 2002 "Contrôle qualité des scènes Landsat 7 Image 2000", 85 pages, 74 figures, document edited for the Joint Research Centre of the European Commission.
- January 2002 "SPOT 123-4-5 Geometry Handbook", 82 pages, 35 figures, 32 equations, document edited for SPOT IMAGE and validated by CNES.
- July 2001 "Scientific Support - Technical Note - Comparison of ESA/USGS Landsat ETM+ Fast Format products", 65 pages, 28 figures, document edited for ESA-ESRIN.
- January 1999 "Le problème des courbes intercalaires dans la construction d'un MNT maillé à partir de courbes de niveau" in Bulletin SFPT n°153, pp.32-34.
- May 1992 "A Combined Algorithm for Automated Drainage Network Extraction" in Water Resources Research, vol.28, n°5, pp.1293-1302.
- January 1992 "Extraction et analyse automatiques d'un réseau hiérarchisé de talwegs. Application à un Modèle Numérique de Terrain dérivé d'un couple stéréoscopique SPOT" in International Journal of Remote Sensing, vol.13, n°2, pp.337-364.
- January 1990 "Paramétrisable skeletonization of binary and multi-level images" in Pattern Recognition Letters, vol.11, pp.25-33.
- June 1988 "Ridges and Valleys lines extraction from Digital Terrain Model" in International Journal of Remote Sensing, vol.9, n°6, pp.1175-1183.
- May 1987 "Nouveaux algorithmes pour l'extraction de lignes de crêtes. Application aux Modèles Numériques de Terrain" in proceedings of MARI.

## MISCELLANEOUS

Born on July 5<sup>th</sup>, 1960 at Provins (77, France).

Married, father of three children.

French nationality.

Passions : Chess and diving.

## PROJECTS

I have managed the following projects:

- PDVSA / BEICIP* **Remote Sensing Training applied to Oil Exploration** – Training of PDVA's managers for the acquisition, processing and interpretation of Earth observation data.
- TOTAL* **Study of Google Earth** – Study, training and demonstrations of Google Earth for the fulfilment of business requirements in the domains of oil exploration, environment management and infrastructures.
- ESA / Brockmann Consult* **CAL/VAL Portal** – Generic description of missions and instruments using the SensorML language to support Calibration / Validation activities performed by the CEOS group.
- ESA / Palestinian Universities* **Remote Sensing Training and GIS in Palestine** – In collaboration with the University of Marne-la-Vallée and with the support of the European Space Agency, VisioTerra has built a GIS of Palestine that has been presented to the universities of Al-Quds, Naplouse and Hebron.
- TOTAL* **Radar methodology** – Development of accurate orthorectification techniques, setting of back-scattering models depending on land cover, and processing of speckle noise.
- UNEP* **OPTEC Gaza** – Processing, control and preparation of data for the inventory of land cover in Gaza Band.
- Gaz de France* **Landsat ETM+ Libya** – Processing, production and restitution of Landsat ETM+ spacemaps for the photo-interpretation of structural geology.
- ESA-ESRIN* **MERIS Product Handbook** – Enhancement and correction of the MERIS product handbook introducing FAQ, applications and level 3 descriptions.
- DGA / Générale d'Infographie* **Georefering study** – Inventory of technical solutions and research actors in the field of georefering.
- TOTAL* **JERS Colombia** – Geocoding, pre-processing and quality control of 38 JERS-scenes.
- UPMC / LCRSSS* **GRAL – Application of remote sensing and GIS to Groundwater Resources Assessment in Libya** – Collaboration with French universities, GAEL, Geosciences and LCRSSS (Libyan Centre for Remote Sensing and Space Sciences) for the analysis of multi-sensor EO data, determination of inverse models, DEM analysis.
- Morocco Marble Exploration* **Envisat ASAR + Landsat ETM+ synthesis** – Geocoding and merging of RADAR and optical images to support photo-interpretation for the detection of marble veins in Moroccan Atlas.
- ESA-ESTEC* **MERIS Geometry handbook**, issued by GAEL Consultant, details the viewing geometry and provides algorithms and programs to orthorectify MERIS images from elevation ancillary data or external DEM(s).
- ESA-ESTEC* **DEM Quality assessment** – Elevations found in ACE (ERS-1/2 Altimetry Corrected Elevations) and in SRTM30 are compared and assessed using external elevation values. Visual inspections results are also reported within a technical note.
- ESA-ESRIN* **MERIS synthesis March-April 2003** - Composition of acquisitions by the MERIS instrument of the Envisat satellite. This 1-km

synthesis processed 10 TB from 1242 segments (more than 600 GB).

- Spacebel / European Commission*    **EOLES / RealCup** – Development and integration of the RealCup system enabling the processing of Envisat / MERIS data in near real-time: less than 3 hours from the telemetry to customised products ready for use in GIS.
- JRC*    **Landsat mosaic of Europe** – Composition of a mosaic of the 15 countries of Europe from more than 300 scenes Landsat ETM+. Study and correction of the misregistrations between the various national projections.
- EADS / EUMETSAT*    **U-MARF V2** – Development and integration of generic engines for metadata extraction, quick-look generation and generic translation able to manage more than 250 product formats.
- EADS / ESA-ESRIN*    **ADAR, Advanced Data Archive** – Specification of an archive management system handling petabytes of heterogeneous data. Development of a prototype implementing most of ADAR requirements.
- ESA-ESRIN*    **AMALFI – ASAR, MERIS, AATSR labelling Facility Inspection.** Development of an integrated system enabling to control Envisat products before their dissemination to end-users, -record and analyse quality control results, -monitor quality control activities in a networked environment.
- SPOT IMAGE*    **SPOT Geometry Handbook** has been issued by GAEL Consultant's specialists. This document describes the instruments, geometry, correction algorithms, formats and ancillary data of SPOT-123, SPOT-4 and SPOT-5 missions.
- Gaz de France*    **Mosaic Landsat ETM PAN+VNIR/SWIR** - Geocoding of Landsat ETM+ scenes from a constellation of geodesic points matching the oil wells in Southern Algeria. Merging of panchromatic and multispectral bands using wavelet transforms.
- ESA-ESRIN*    **Development of Envisat LVL0 Analysis and Product Comparison Tool** for the qualification of the instruments processing facilities (IPF) during SODAP (Switch On and data Acquisition Phase) and calibration / validation phases.
- JRC - SAI*    **Quality control of Image 2000 Landsat ETM+ scenes.** Radiometry and geometry checking performed from maps and GPS acquisition. Delivery of HTML quality control reports.
- EURIMAGE*    **Orthorectification and PAN+VIS merging of Landsat ETM+ scenes of France.** Scenes were used to build 3D views of Tour de France 2001 on a Web site.
- ESA-ESRIN*    **Support and maintenance for the quality control of Landsat scenes acquired over Europe.** Scientific support, definition of quality control procedures, software upgrades and processing of rejected products.
- JRC - SAI*    **IRS WiFS orthorectification.** Delivery of multi-temporal space maps and mosaicking to identify burned areas over Europe.
- SPOT IMAGE*    **Evolutive maintenance of QUISS system** for the quality control of SPOT scenes produced by direct receiving stations.
- Agence de l'Eau Seine-Normandie*    **Classification of Landsat 7 ETM+ scenes** and qualification of procedures by comparative analysis with Landsat 5 TM and SPOT XS classifications.
- GlobeExplorer*    **Delivery of aerial photos mosaics** of various French cities for distribution through an electronic portal.

<i>ONIC</i>	<b>Orthorectification</b> of SPOT, Landsat TM and IRS-1C scenes and specific processing of these images to favour the agricultural inventory. Orthorectification of Landsat 7 ETM+ images within non-covered zones.
<i>GEOSYS</i>	<b>Delivery of orthorectified scenes</b> Landsat and SPOT according to particular projections of various countries.
<i>Sierra Productions</i>	<b>Delivery of orthorectified Landsat 7 ETM+ mosaics</b> used as a texture for the presentation of the "Tour de France 2000" on a Web site.
<i>ESA-ESRIN</i>	Study of baseband <b>archive formats</b> (FRED, MDPS, Gerald, Vexcel...) used in receiving stations. Development of a new <b>format for the interchange of archives</b> (CEOS ICF).
<i>CGG-TOPNAV</i>	<b>Delivery of spacemaps</b> SPOT P+XS, Landsat TM and ETM+. Support for the <b>photo-interpretation assisted by computer</b> using the software INTERP developed by GAEL Consultant.
<i>Telespazio</i>	<b>High accuracy georeferencing</b> of Landsat TM scenes (full, mini, quarter) for a perfect superimposition of less than 1 pixel (30 meters) between multi-temporal images.
<i>ESA-ESRIN</i>	Development of an application for the <b>quality control of Envisat satellite / MERIS instrument</b> . Delivery of software development environment allowing the Customer to add his own tests.
<i>Telespazio</i>	Development and tuning of the production chain and quality control procedures in the framework of <b>MARS project</b> . On-site assistance for the start of orthorectification process.
<i>ESA-ESRIN</i>	On-site assistance performed by one of our engineers, specialist of ERS-SAR image processing. Editing of quality control reports gathered from on-board recorded data.
<i>Telespazio</i>	Study of the IRS-1C data: location accuracy, orthorectification and radiometry. Editing of a "IRS-1C Data Quality" report.
<i>ESA-ESRIN</i>	Upgrade of QUISS software for the <b>quality control of Landsat 4/5 TM and Landsat 7 ETM+ products</b> . Installation of QUISS at the stations of Fucino, Kiruna, Neustrelitz and Maspalomas.
<i>Agence de l'Eau Seine-Normandie</i>	Assembly of a <b>mosaic of 56 SPOT panchromatic scenes</b> orthorectified and colorized from a mosaic of Landsat TM scenes.
<i>ESA-ESRIN</i>	Development of a <b>Web site</b> showing the latest data acquired by the <b>ERS scatterometer</b> and the evolution during the last three days by display of derived images.
<i>FAO - Telespazio</i>	Development of the production chain and set up of procedures for the generation of space maps over Africa. Analysis of the anomalies of Landsat 5 trajectory.
<i>ESA-ESRIN</i>	Tools for the import and visualization of <b>ERS scatterometer</b> data. Generation of streamlines and derived products from wind vector fields.
<i>France 2 - Geosys</i>	Assembly of a complete <b>mosaic of France from Landsat TM</b> data (more than 44 scenes). This mosaic serves as texture for meteorological presentations at the French TV through 3-D animations.
<i>RAI 1 – Telespazio</i>	Realization of a complete <b>mosaic of Italy from Landsat TM</b> data (more than 38 scenes). This mosaic serves as texture for meteorological presentations at the Italian TV.

<i>ESA-ESRIN</i>	<b>Quality analysis</b> of images produced by MMBS and MUIS Internet servers. Editing of « Evaluation of Browse Data Quality in ESRIN On-line Services » report.
<i>SPOT IMAGE</i>	<b>Application QUISS for SPOT images quality control</b> applied to certify scenes produced by the worldwide Direct Receiving Stations.
<i>Elf Aquitaine</i>	Conception of a <b>video film</b> showing a virtual flight over Pyrenees chain from SPOT P, Landsat TM images and a 10 meters DEM.
<i>IMA / GEO</i>	Georeferencing and orthorectification of video images acquired from helicopter missions along high voltage lines. Processing of images from Russian <b>KVR 1000</b> satellite.
<i>CGG</i>	Detection of coralline reefs and generation of bathymetric curves from « <b>Blues Analysis</b> ».
<i>Nova Telespazio</i>	Application <b>GEOREF / MAPPER</b> for georeferencing and geocoding images into a wide set of map projections. Development of orbital models for the generation of accurate space maps.
<i>ELF Aquitaine</i>	Development of <b>INTERP</b> application, an expert <b>photo-interpretation system</b> using dedicated toolboxes (Geology, Drawing, Cartography...) to be applied to remote sensing and cartographic images. Development of geological quantification tools.
<i>ELICS</i>	Generation of Digital Elevation Models from <b>SONAR bathymetry data</b> . Development of techniques to mosaic DEM swaths.
<i>Nova Telespazio</i>	Applications <b>REGIST / MOSAIC</b> for the radiometric and geometric mosaicking. Application to the generation of space maps in the framework of Africover project (FAO).
<i>CGG</i>	Processing and rectification of SPOT, Landsat and road cartography images. <b>Evaluation, modelling and correction of geometric deformations produced by scanners</b> .
<i>Fucino Receiving Station</i>	<b>SPOTCD</b> system for the formatting, mastering and recording of CD-ROMs containing SPOT scenes.
<i>Regional Council of Sardinia</i>	Development of SAR software for <b>meteorological and agricultural monitoring</b> from ground stations and satellite images (NOAA, Meteosat). Programming of applications using ERDAS Toolkit for communication with ORACLE7 database.
<i>Nova Telespazio</i>	Development of <b>SPOTQC</b> software for quality control of SPOT images received and processed at Fucino station.
<i>ELF Aquitaine</i>	<b>Support</b> for processing of remote sensing images in the visible domain (Landsat, SPOT, NOAA) and Radar (STAR 1, ERS-1). Participation in production of <b>cartographic products</b> .
<i>Telespazio SpA</i>	Development of <b>SALV</b> software of vehicles tracking within urban areas using GPS positioning.
<i>SNEAP</i>	<b>Maintenance and upgrade of image processing software</b> for geology and remote sensing. Decoding and visualization of multi-mission and multi-format data.